

## CLAIMS

What is claimed is:

1. A multiple speed power transmission, comprising:  
5 an input shaft;  
a layshaft disposed parallel to the input shaft;  
a pair of drive elements including a first element secured to the input shaft, and  
a second element journaled on the layshaft and driveably connected to the first  
element;  
10 a first coupler secured to the layshaft for releasably coupling the second  
element and the layshaft;  
an output; and  
a planetary gear unit driveably connecting the layshaft and the output, including  
a sun gear secured to the layshaft, a ring gear surrounding the sun gear and fixed  
15 against rotation, a carrier driveably connected to the output, and a set of planet pinions  
meshing with the sun gear and ring gear and rotatably supported on the carrier.
2. The transmission of claim 1, further comprising:  
an input; and  
20 a clutch driveably connected to the input for alternately connecting and  
disconnecting the input and the input shaft.
3. The transmission of claim 1, further comprising:  
an input;  
25 a second input shaft;  
a clutch driveably connected to the input and input shaft, for alternately  
connecting and disconnecting the input and the input shaft;  
a second clutch driveably connected to the input and second input shaft, for  
alternately connecting and disconnecting the input and the second input shaft; and

a second pair of drive elements including a third element secured to the second input shaft, and a fourth element journaled on the layshaft and driveably connected to the third element; and

5 a second coupler secured to the layshaft for releasably coupling the fourth element and the layshaft.

4. The transmission of claim 1, further comprising:

an input;

a second input shaft;

10 a clutch driveably connected to the input and input shaft, for alternately connecting and disconnecting the input and the input shaft;

a second clutch driveably connected to the input and second input shaft, for alternately connecting and disconnecting the input and the second input shaft; and

15 a second pair of drive elements including a third element secured to the second input shaft, and a fourth element journaled on the layshaft and driveably connected to the third element;

a third pair of drive elements including a fifth element secured to the second input shaft, and a sixth element driveably connected to the fifth element; and

20 a second coupler secured to the layshaft for releasably coupling the fourth element to the layshaft and the sixth element to the layshaft.

5. The transmission of claim 1, further comprising:

an input;

a second input shaft;

25 a clutch driveably connected to the input and input shaft, for alternately connecting and disconnecting the input and the input shaft;

a second clutch driveably connected to the input and second input shaft, for alternately connecting and disconnecting the input and the second input shaft; and

a second pair of drive elements including a third element secured to the second input shaft, and a fourth element journaled on the layshaft and driveably connected to the third element;

5 a third pair of drive elements including a fifth element secured to the second input shaft, and a sixth element driveably connected to the fifth element; and

a second coupler secured to the layshaft for releasably coupling the fourth element to the layshaft and the fifth element to the layshaft.

a third coupler secured to the output for releasably coupling the sixth element and the output.

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6. The transmission of claim 1, further comprising:

an input;

a clutch driveably connected to the input for alternately connecting and disconnecting the input and the input shaft;

15 a second layshaft disposed parallel to the input shaft and driveably connected to the carrier;

a fourth pair of drive elements including a seventh element secured to the input shaft, and an eighth element journaled on the second layshaft and driveably connected to the seventh element; and

20 a fourth coupler secured to the second layshaft, for releasably coupling the eighth element to the second layshaft and the second element to the second layshaft.

7. The transmission of claim 1, further comprising:

25 a second layshaft disposed parallel to the input shaft and driveably connected to the output;

a fourth coupler secured to the second layshaft, for releasably coupling the second element to the output.

8. The transmission of claim 3, wherein the second input shaft is arranged coaxially with the input and the input shaft.

9. The transmission of claim 4, wherein the second input shaft is arranged  
5 coaxially with the input and the input shaft.

10. The transmission of claim 5, wherein each of the first, second and third pairs of drive elements includes a pinion and a gear in meshing engagement with the corresponding pinion.  
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11. The transmission of claim 5, wherein each of the first, second and third pairs of drive elements includes a first sprocket wheel, a second sprocket wheel, and a chain driveably engaged with the first sprocket wheel and the second sprocket wheel.

12. The transmission of claim 6, wherein the fourth pair of drive elements  
15 includes a pinion and a gear in meshing engagement with the corresponding pinion.

13. The transmission of claim 6, wherein the fourth pair of drive elements includes a first sprocket wheel, a second sprocket wheel, and a chain driveably  
20 engaged with the first sprocket wheel and the second sprocket wheel.

14. A multiple speed power transmission, comprising:  
an input, first input shaft and second input shaft arranged coaxially on a first axis;  
25 an output and layshaft arranged coaxially on a second axis;  
a first clutch for alternately connecting and disconnecting the input and the first input shaft;  
a second clutch for alternately connecting and disconnecting the input and the second input shaft;

first torque transmitting paths for driveably connecting the layshaft to the first input shaft;

second torque transmitting paths for driveably connecting the layshaft to the second input shaft;

5 third second torque transmitting paths for driveably connecting the first and second input shafts to the output; and

a fourth torque transmitting path including a planetary gear unit producing a speed reduction between the layshaft and the output.

10 15. The transmission of claim 14, wherein a first torque transmitting path includes:

a first pair of drive elements including a first element secured to the first input shaft, and a second element journaled on the second axis and driveably connected to the first element;

15 a first coupler secured to the layshaft for releasably coupling the second element and the layshaft.

16. The transmission of claim 14, wherein a second torque transmitting path includes:

20 a second pair of drive elements including a third element secured to the second input shaft, and a fourth element journaled at the second axis and driveably connected to the third element; and

a second coupler secured to the layshaft for releasably coupling the fourth element and the layshaft.

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17. The transmission of claim 14, wherein second torque transmitting paths include:

a second pair of drive elements including a third element secured to the second input shaft, and a fourth element journaled at the second axis and driveably connected to the third element; and

a third pair of drive elements including a fifth element secured to the second input shaft, and a sixth element journaled at the second axis and driveably connected to the fifth element; and

a second coupler secured to the layshaft for alternately releasably coupling the fourth element and the sixth element to the layshaft.

10        18.    The transmission of claim 14, wherein:

a first torque transmitting path includes a first pair of drive elements including a first element secured to the first input shaft, and a second element journaled at the second axis and driveably connected to the first element; and a first coupler secured to the layshaft for releasably coupling the second element and the layshaft; and

15        second torque transmitting paths include a second pair of drive elements including a third element secured to the second input shaft, and a fourth element journaled at the second axis and driveably connected to the third element; a third pair of drive elements including a fifth element secured to the second input shaft, and a sixth element journaled at the second axis and driveably connected to the fifth  
20        element; and a second coupler secured to the layshaft for releasably coupling the fourth element and sixth element to the layshaft.

19.    The transmission of claim 14, wherein a third torque transmitting path includes:

25        a third pair of drive elements including a fifth element secured to the second input shaft, and a sixth element journaled at the second axis and driveably connected to the fifth element; and

a third coupler secured to the output for releasably coupling the sixth element and the output.

20. The transmission of claim 18, wherein each of the first, second and third pairs of drive elements includes a pinion and a gear in meshing engagement with the pinion.

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21. The transmission of claim 18, wherein each of the first, second and third pairs of drive elements includes a first sprocket wheel, a second sprocket wheel, and a chain driveably engaged with the first sprocket wheel and the second sprocket wheel.

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22. The transmission of claim 14, wherein the planetary gear includes:

a sun gear secured to the layshaft;

a ring gear surrounding the sun gear and fixed against rotation; and

a carrier driveably connected to the output; and

a set of planet pinions rotatably supported on the carrier and in meshing

15 engagement with the sun gear and ring gear.